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ABSTRACT

A pre/post experimental-control design was used to evaluate a social studies curriculum based upon inquiry methods. Subjects were 308 eighth-grade students. The results indicated that there were no significant changes in creative thinking, attitudes toward power, understanding of power concepts, and problem-solving skills as a result of experience with the inquiry curriculum. There was significant improvement in information mastery. In addition, student attitudes toward their experiences and the instructional materials were positive. The gaming and discussion sessions were viewed by students as having a beneficial effect on their interaction skills and comprehension of the subject matter. (Author)

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An Evaluation of the Impact of an Inquiry Curriculum in Social Studies on Pupil Growth in Selected Cognitive Functions*

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Recent literature reflects a rapid growth in the application of inquiry instructional methods in elementary and secondary schools. "Discovery-learning" curricula, while reflecting a wide diversity of objectives, content and procedures, all share a group of objectives concerned with the cognitive growth of students. Though individual statements of objectives vary, each usually concerns concept formulation and manipulation, investigation and problem-solving skills, and information mastery.

Hard data describing the effectiveness of specific process-oriented curricula in reaching their identified objectives are rare (Ausebel and Robinson, 1969). In part, this lack of data is caused by the difficulty of measuring student growth in certain cognitive skills and therefore of drawing conclusions about the relative effectiveness of competing curricula.

PROBLEM

The primary purpose of this research was to determine the impact of a particular inquiry-oriented social studies curriculum package (From Subject To Citizen) on pupil growth in selected cognitive functions. A secondary purpose was to determine the affective reactions of students toward a prolonged and intensive inquiry-structured instructional experience.

Of interest to this study were three cognitive functions which might be identified as manipulation of concepts concerning "power," general thinking or problem-solving and information mastery. Student affective reactions studied were those relating to content, instructional activities, design and format of materials, and patterns of interaction with peers and teacher.

PROCEDURES

Subjects: The subjects were 308 students enrolled in 12 sections of

eighth-grade history in a large suburban school district in Texas. Of these, 161 students in six class sections, taught by three teachers, were designated as the experimental group, while the remaining 147 students in six class sections, taught by four teachers, served as controls. Teachers were selected from a pool of volunteers based on school schedules and programs (i.e., specific attention was given to avoid potentially biasing conditions such as ability-grouped classes) rather than teacher characteristics. Assignment to experimental and control conditions was randomly achieved.

Instructional Experiences: The experimental classes used a social studies package entitled From Subject To Citizen, developed by the Educational Development Center of Cambridge, Massachusetts. Consisting of five units of study, it was designed to explore the bases of the American political system using inquiry methods. The control classes experienced the regular eighth-grade history curriculum, which was built around a textbook entitled Quest For Liberty, published by Field Education Publication of Palo Alto, California. Though this adopted text was selected to aid teachers in using inquiry modes of instruction (and is used in many school districts for that purpose), systematic class observation, prior to and during the study, revealed no disciplined use of inquiry strategies in the control classes.

Data-Gathering Instruments: Students' basic comprehension of power concepts was measured by the Rotter I.E. Scale (Rotter, 1966) and a questionnaire composed of twenty multiple-choice and open-ended items designed to measure students' comprehension of power relationships within American society. Form E of the Dogmatism Scale (Rokeach, 1960) was used to determine students' attitudes toward power.

The Torrence Test of Creative Thinking measured the fluency, flexibility, and originality of creative thinking. Measurement of problem-solving skills

was tested by a questioning game following the procedure of Mosher and Hornsby (1966) to identify "constraint-seeking" and "hypothesis-scanning" strategies of problem-solving. A fifty item multiple-choice test was developed from the curriculum material to measure student mastery of specific content information.

A questionnaire composed of multiple-choice and open-ended items designed to record student likes and dislikes regarding their curriculum experiences measured attitudes toward instruction. This instrument was correlated with interviews of pupils and teachers.

Teacher Training: Initially, the researchers instructed the experimental and control teachers in testing procedures. Five subsequent two-hour training sessions in the use of the new curriculum materials were provided for the experimental teachers at intervals throughout the duration of the field study as new segments of the curriculum were encountered. In addition, the researchers made regular visits to the experimental and control classes during the year to guide the experimental teachers in their operation of the new curriculum and to ensure that in control classes there was no radical altering of instructional patterns or borrowing of experimental materials.

Data Collection: To answer the specific questions posed by the general concerns of the field study, a pre-post-experimental-control group design was employed. The impact of testing was limited through the administration of tests by teachers in the normal class setting under the supervision of the researchers. Following the pretesting, the experimental and control classes began their respective studies. Posttesting was administered in the same manner as the pretest after an eight-month interval when the groups had completed their respective curricula.

The problem-solving test was given individually by the experimenters

to a random sample of 40 students composed of an equal number of experimental and control students. Testing for problem-solving skills also followed a pre-post design and was administered one week after administration of the group tests.

Following the experimental manipulation, the data gathered were prepared for statistical treatment. Analysis of covariance and correlated t tests were used to determine the significance of the findings.

RESULTS

Changes between pretest and posttest scores measuring comprehension of power concepts and attitudes toward power proved not to be significant. The results of the analysis of covariance for comprehension of power relationships yielded an F of .51, df = (1,303), $p > .48$. Similarly, the F's for the Rotter I.E. and Dogmatism Scales were .74, df = (1,301), $p > .38$ and .44, df = (1,303), $p > .50$; respectively. A complete recording of these data is given in Table 1.

As may be observed in Table 2, analysis of covariance applied to the data for the three subscales of the Torrence Test of Creativity did not significantly differentiate between the performance of the experimental and control classes. The F's obtained for the three subscales were as follows: Fluency F = .004, df = (1,301), $p > .94$; Flexibility F = .013, df = (1,301), $p > .90$; Originality F = .0002, df = (103), $p > .98$.

Analysis of the data obtained by the Mosher and Hornsby technique demonstrated that there was very little difference in the changes in the problem-solving strategies employed by the experimental and control classes. Constraint-seeking made up 7% of the pretest questions of the experimental classes, increasing to 11% during posttesting. On the other hand, control

TABLE 1

Results of Analysis of Covariance for Comprehension of Power, I.E., and Dogmatism Scales for Experimental and Control Groups

Source	df	Sum of Squares	Mean Square	F	p
		Comprehension of Power Scale			
Between groups	1	36.89	36.89	.51	>.48
Within	303	21932.90	72.39		
Total	304	21969.79			
		I.E. Scale			
Between groups	1	6.09	6.09	.74	>.38
Within	301	2463.14	8.18		
Total	302	2469.23			
		Dogmatism Scale			
Between groups	1	217.75	217.75	.44	>.50
Within	303	148426.38	489.86		
Total	304	148644.13			

TABLE 2

Results of Analysis of Covariance on Three Subscales of the Torrence Test of Creativity for Experimental and Control Groups

Source	df	Sum of Squares	Mean Square	F	p
		Fluency			
Between groups	1	.29	.29	.004	>.94
Within	301	19745.62	65.60		
Total	302	19745.91			
		Flexibility			
Between groups	1	.87	.87	.013	>.90
Within	301	20057.13	66.64		
Total	302	20057.99			
		Originality			
Between groups	1	.02	.02	.0002	>.98
Within	301	19233.19	63.90		
Total	302	19233.20			

class constraint-seeking questions changed from 9% to 10% from pretesting to posttesting.

Results of a correlated t test (see Table 3) used to analyze changes in information mastery for the experimental classes showed that there was a significant gain in information as a result of their experiences ($t = 14.78$, $df = 148$, $p < .0005$).

TABLE 3

Results of Correlated t Test for Information Mastery of the Experimental Group

	Pre	Post	t	df	p
Means	51.57	80.39			
Standard Deviation	16.67	22.43	14.78	148	$< .0005$

Analysis of the experimental classes' opinions of their curriculum experience (see Table 4) show that a majority were aware of the differences between their course and other social studies courses. They also expressed the belief that it was the "best social studies course" (40%) or "better than most" (34%) they had experienced.

When specifically queried about the curriculum materials, approximately 48% liked the questioning format while only 12% registered disapproval. The arrangement of the materials into small booklets rather than a larger text was also favorably received by the students (79%). Fifty-two percent felt that the political power concepts represented in most of the materials and activities were understood. Repetition in the materials was viewed by most as expeditious of good understanding (36%) or at least not to the point of

TABLE 4

Summary of Pupil Attitudes Toward Inquiry Curriculum

Experiences Recorded by the Student Opinionnaire

Amount of difference between this course and other social studies courses

Very Different	Somewhat Different	Not Different	No Response
59%	39%	1%	1%

Preference for this course when compared to other social studies courses

Best	Better Than Most	Better Than Some	The Same	Not As Good	No Response
40%	34%	12%	4%	7%	3%

Organization of materials around questions

Like It A Lot	Like It A Little	OK	Disliked It A Little	Disliked It A Lot	No Response
20%	28%	38%	8%	4%	1%

TABLE 4 (Continued)

Arrangement of the textual materials in small booklets

All Texts Should Be This Way	Better Than One Book	No Preference	One Book Better	One Book Much Better	No Response
51%	28%	10%	4%	4%	3%

Understanding of the representation of political power in material and activities

In All Activities	In Most Activities	In Some Activities	In A Few Activities	In None Of The Activities	No Response
8%	52%	25%	11%	1%	3%

Repetitious nature of materials

Enough For Good Understanding	Yes, But Not Annoying	Yes, A Little Annoying	Yes, Too Repetitious	No Response
36%	32%	23%	7%	3%

Relationship between activities and reading material

Activities Gave Information Not In Text	Activities Helped With The Text	Activities Related To Text As Usual	Activities Gave A Little Help With Text	Activities Gave No Help With Text	No Response
43%	35%	16%	4%	2%	0%

TABLE 4 (Continued)

Participation in simulations and games

Great Fun - Learned A Lot	Made Study More Interesting - Learned Some	Fun - Not Sure I Learned Anything	Fun - Did Not Learn Anything	No Response
37%	44%	13%	4%	2%

Interaction with teacher as compared with other classes

A Lot More	A Little More	About The Same	A Little Less	A Lot Less	No Response
50%	25%	19%	2%	3%	3%

Feelings toward small group activity

Liked A Lot	Liked A Little	Same As Other Activities	Would Like A Little Less Group Activity	Would Like A Lot Less Group Activity	No Response
58%	30%	5%	3%	2%	3%

Expression of ideas in group activities

Improved A Lot	Improved A Little	No Change - But Had No Trouble	No Change - Still Have Difficulty	No Response
33%	49%	11%	4%	3%

TABLE 4 (Continued)

Listening to and understanding ideas with which you do not agree

Able To Listen More Carefully	Able To Listen With Some Attention	About The Same - Always Did Listen	About The Same - Do Not Listen To Stupid Ideas	No Response
32%	43%	18%	5%	3%

being annoying (32%).

Students of the experimental group were quite favorably impressed with the activities presented in the experimental curriculum. A majority felt that the activities aided their learning by providing information not found in the text (43%) or by helping with the text (35%). The simulation and gaming was viewed as being fun by some (37%) or making study more interesting by others (44%) with both admitting to have learned as a result of them. In addition, 75% of the group indicated that they had more opportunity to interact with the teacher than in regular classes.

When provided with the opportunity to respond to questions measuring feelings about the group activities which are a part of the inquiry curriculum, 88% found them to be attractive. Seventy-five percent viewed group discussion as providing them with a greater appreciation for ideas contradictory to their own, while an even larger majority (82%) admitted to an improvement in self-expression in groups.

Students' open-ended comments about the experimental curriculum were quite favorable. One factor impressing students was the amount of teacher-student interaction offered by the experimental program. Not only did they indicate an increase in the frequency of interaction, but it also appeared to be more positive than that experienced in other classes.

Several students expressed surprise that history could be as interesting and fun as the course proved it to be. They felt that a similar approach should be used with other subject matter.

Negative comments were generally related to the lack of maturity discovered in some students while working in groups. Apparently, a few found group activity a good cover for shirking responsibility. One student, for example, admitted that he used the group to do his work for him. Another

complained of other students "goofing off too much."

DISCUSSION

The present study may be classified as field-based curriculum evaluation. As such, it attempts to bring enough research sophistication and control to the rough-and-tumble learning environment of the suburban middle school so that questions concerning instructional effectiveness can be answered at a level of validity which makes these answers useful in curriculum decision-making. If that has indeed been accomplished, it becomes the responsibility of the researcher to interpret the data in such a way as to maximize its usefulness to school practioners. The present authors believe, then, that reporting research of this type includes a responsibility to go beyond the stating of statistical significance or the lack of it.

The results of the present study do not lend striking support for the inquiry method as a builder of "thinking skills," therefore corroborating the theme presented by Ausebel and Robinson (1969). The inquiry-structured curriculum studied here (From Subject To Citizen) did not, for example, have a significant impact on those cognitive processes measured by the Torrence Test of Creative Thinking. However, there may be factors of time and intensity, not controlled for, influencing that result. As Cox (1969) has noted, "First, it seems naturally predictable that only a certain portion of the students will respond significantly to an inquiry treatment in social studies classrooms. However, given an holistic inquiry approach entailing inquiry goals, strategies, and materials in all classrooms over a long period of time, the maximum size of that portion, while unpredictable, is incredible."

Three of the measures employed in this study sought to determine if students would generalize processes and principles from the situations in the

experimental curriculum and transfer them to dissembler situations. The I.E. Scale was used to determine if the study of power, its sources and uses in a given historical context, would influence the student's attitudes toward his own power relationships. The power conceptualization instrument presented the sources and uses of power not directly presented in the content of the experimental inquiry curriculum to determine if the students would generalize from one set of power relationships to a dissimilar set. The Mosher and Hornsby procedure was used to determine if experiences with a variety of analytical processes would result in the employment of a specific constraint-seeking behavior.

In each of these instances, the students did not develop generalizations which they transferred to the new situations contained in the testing procedures. There would seem to be two explanations for the failure of transfer. One is that the content of the learning experience and test situations, while appearing to have some rather direct connections, may in fact be so different as to make substantial transfer an unrealistic expectation. This may be the case in regard to dogmatism and conceptualization of power. A second explanation is that given analytical processes may have to be learned by direct study and are not essential ingredients of and therefore derivable from general inquiry activity. Such might be the case in the particular constraint-seeking behavior sought by the Mosher and Hornsby technique. This view would seem to be compatible with that of Suchman (1965).

The impact of the From Subject To Citizen inquiry curriculum was strikingly positive in two major instances, pupil mastery of information and pupil attitudes toward instruction. As many as 73% of the students in the experimental group indicated that they enjoyed the inquiry curriculum more than any other social studies course they had taken. In addition, pretest-posttest

measures indicated pupil mastery of content to be significant beyond the .0005 level. These two results, when taken together, may provide a strong reason for the use of inquiry curricula even if its precise impact on sophisticated cognitive processes remains somewhat doubtful. In his recent reappraisal of the past decade-and-a-half of curriculum development activity, Jerome Bruner (1971) states, "First, consider getting pupils to want to learn something...."

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